

THURSDAY, JUNE 12, 1884

BRITISH MITES

The British Oribatidæ. By A. D. Michael. (Ray Society, 1884.)

WE congratulate the Ray Society on this valuable addition to their excellent series of monographs. Mr. Michael indeed modestly asks us to "kindly remember that this book is the record of work done in the scanty leisure of a very busy man," but though this may add to our gratitude, and serve as an encouragement to others, no one, we think, after reading the book will feel that any excuse or apology was needed. When Mr. Michael commenced his study of this curious family of mites scarcely any species were recorded as British, there were very few of which the whole life-history was known, and Nicolet's was the only work dealing with the anatomy of the family.

Mites are not perhaps a very attractive group, nevertheless many species are extremely curious and some very pretty, as a glance at Mr. Michael's excellent figures is sufficient to show, especially those of *Tegeocranus latus*, *Leiosoma palmicinctum*, and *Cepheus ocellatus*; possibly indeed, says Mr. Michael, "no more bizarre or remarkable creatures exist than these, when nearly fully grown, and bearing on their backs, ring within ring, concentric circles or ovals of these curious and disproportionately large line-of-beauty shaped spines formed of clear, colourless chitin, and strongly serrated in the first species, and of the beautiful and iridescent membranous fans in the two latter."

Some, he adds, especially "of the immature stages are amongst the most beautiful creatures of the order; and only those who are not acquainted with the Acarina can suppose that none are beautiful. It is needless to say that the Oribatidæ are highly interesting and instructive, because the same thing may be said of every family of created beings; no one can devote himself to the study of any class of organism without becoming from day to day more deeply impressed with the admirable manner in which its members are adapted to their wants, and the marvellous way in which the different parts are varied in different species, so as to provide more efficiently for their protection and continuance. This fact of having constantly before his eyes the wonders of the individual family or order which he is investigating is apt to cause the specialist to forget for the time that there are hundreds of other families equally interesting, beautiful, and wonderful in their construction and life-histories. It is only by endeavouring to base his special knowledge upon the wider foundation of general interest in the works of nature that the naturalist escapes this error, and appreciates the harmony between the particular class and other equally glorious types of life. Endeavouring to bear all this in mind, I feel that I am not justified in saying that the Oribatidæ have any claim on the biologist beyond that of any of the endless varieties of other forms of animals; but I do say that they have an equal claim; and I think I may confidently assert that any observer who inquires into the complex structure

of these minute creatures, their singular life-histories, or the quaint and somewhat exceptional habits of some of the species, will rise from his task fully rewarded for the time that he has spent."

The work is divided into two parts: in the first the author gives an account of the terminology, literature, classification, development, habits, methods of collection and preparation, and anatomy; while the second is devoted to descriptions of the genera and species.

The principal home of the Oribatidæ is in moss of various sorts, on lichens, and in fungi; others live in dead wood, many are found in the debris under furze bushes, in the needles of which the nymphs burrow. Pelops, Hoplophora, and others are found among the fallen leaves of Scotch pines; some frequent other trees, while *Oribata sphagni* and *Notaspis lacustris* are aquatic. The whole family with one doubtful exception are vegetable feeders; and, being without any weapons of offence, are all the more in need of defensive arrangements, with which indeed they are liberally provided. Their carapace is thick, with in many cases curious provisions for the protection of the legs, and they most of them have the habit of shamming dead.

Mr. Michael differs from the account given by Nicolet of the internal anatomy in several important respects, and considers that the conspicuous organs, usually called stigmata, are really organs of sense, probably of hearing or smell and he says, "I incline to the former."

The life-history falls into four well-marked periods—the egg, larva, nymph, and imago. Dujardin indeed asserted that the Oribatidæ are viviparous, and the statement has been repeated in various standard books, but as a general rule the reverse is the case. The egg is generally elliptical, or cylindrical with rounded ends. In some cases it absorbs moisture, and the exterior membrane, being hard and brittle, splits longitudinally and allows the inner or vitelline membrane to be seen through the opening. This constitutes the stage called by Claparède the "Deutovum."

The larva is invariably hexapod, and all six legs are monodactyle, tridactyle tarsi being confined to the imagos. The larval stage is comparatively short, generally lasting from three weeks to two or three months. Mr. Michael does not consider that the larva undergoes any change of skin until it passes into the nymph.

The nymph "may be defined as the creature after it has become octopod," but before the first month. It is the principal period of growth and occupies a considerable proportion of the lifetime; "it is also the time of gay colouring and of beauty." "When the nymph is fully fed, and is about to become an imago, it creeps into a hole, or some other sheltered position, stretches out its legs, fixing its large monodactyle claws firmly into the substance it is resting on, and then gradually becomes inert, perfectly motionless, and to all appearance dead; it ceases to feed, and does not exhibit any sign of life if touched or injured."

Mr. Michael coincides with the opinion of Claparède and Mégnin that during this period there is an entire reorganisation of the internal structures, and "the different parts of the body of the adult are formed, not at the expense of the same parts of the nymphs, but from the general body substance."

Till Mr. Michael traced the life-histories of these creatures, the immature stages of eight species only were known to us. Nicolet, indeed, gives eleven, but as to three he is, in Mr. Michael's opinion, certainly in error. In all other species the life-history when known has been traced by Mr. Michael himself.

In breeding Mr. Michael used glass cells "composed of ordinary microscopical glass slips 3×1 inch, having in the centre, fastened by marine glue or Canada balsam, a glass ring made of a transverse slice of glass tubing about $\frac{3}{8}$ or $\frac{7}{8}$ inch in diameter, the length of the tube, and consequently the depth of the cells, being usually about $\frac{3}{8}$ inch. The tubing I employ is of tolerably thin glass, if very thick it is opaque, and leaves little room inside the cell. Over this a thin glass cover, rather larger than the diameter of the tubing, was laid, either a circle or a square; the latter is often handy, as the projecting corners are convenient to take it on or off by, or sometimes a second slide or a broken piece of one is more serviceable. This cover was always quite loose, and simply held on by an ordinary brass-wire microscopical spring-clip; of course the upper edge of the slice of glass tube required to be smooth, so that the cover would lie flat upon it, and not allow the minute prisoners to escape. A cell so prepared was carefully cleaned out, and examined under the microscope, to see that it did not contain Acarina or ova. A small piece of thick white blotting-paper, not large enough to cover the whole bottom of the cell, was then placed in it and damped; a piece or two of growing moss or fungus was then placed in the cell, having first been carefully examined under the microscope to see that it also was free from Acarina and ova, and the cell was then ready for use. One or two specimens of the larva, nymph, or species to be observed, were placed in the cell, never so many but what I knew each individual specimen; the cover was put on, fixed with the clip; a label with a statement of what was inside affixed to the slip, and the whole put away in the dark or very dull light."

Another good mode of providing the fungus-eating species with food Mr. Michael found to be by putting a minute piece of mouldy cheese in the cell; this soon bore a fine crop, which was highly appreciated. He found these simple cells answer better than any more elaborate apparatus. Mr. Macintyre's ingenious cork cells, so useful for many small insects, are not suitable for Oribatidæ, in the first place because many are wood-borers, and even those which are not often get lost in the interspaces of the cork. He also found that these cells got dry more rapidly.

He tells us indeed (and having had some experience in similar observations I doubt not that it is so) that no portion of his work has been either more laborious or more interesting than that of tracing the life-histories of the different species through their immature stages. The creatures are minute, scarcely visible indeed to the naked eye, they avoid the light and always endeavour to hide themselves, and yet they must be frequently examined to see what is going on. They must not be touched with any hard instrument, and lastly their transformations last for many months, sometimes for more than a year.

It is obvious indeed that his observations required great and constant care. The hygrometric condition of the cell required continued watching, since if it were made too

damp or allowed to get too dry, even for an hour, the labour of months would be lost. Mr. Michael carried his mites about with him on any journey, but it is obvious that alone he would have been wholly unable to devote sufficient time to the care of them, and it was, he tells us, mainly to his wife's patient attention and skilled fingers that his success in rearing them was due. To Mrs. Michael then, as well as to her husband, we will tender our warm thanks and congratulations on this excellent contribution to the natural history of the British Isles.

JOHN LUBBOCK

INJURIOUS INSECTS

Reports of Observations of Injurious Insects and Common Crop Pests during the Year 1883; with Methods of Preservation and Remedy. By Eleanor A. Ormerod, F.R.Met.Soc., &c. Pp. 1-80 and 1-16. (London: Simpkin, Marshall, and Co., 1884.)

WE have to congratulate Miss Ormerod on having again produced an excellent summary of the evil doings of injurious insects in this country during the past year. It is full of interesting and useful information, from personal observation, and from the reports sent in by the staff of assistants she has enlisted into her service. Regarded from a popular point of view these annual Reports do great service by explaining to those interested the real nature of their insect foes; from a scientific point of view they may do good service by stimulating inquiry, and occasionally bringing to light the hitherto unknown life-histories of certain species; and they should do paramount service from an economical point of view. This latter is really the most important of all, and the item of *expense* in application of remedies is always a serious consideration. With some crops it may sometimes be doubtful if the outlay would be sufficiently recouped; with others (hops for example) the case is different. In that year of hop-famine, 1882, we heard of one grower who expended 15*l.* an acre on washing, and was amply and abundantly repaid, but if all had done the same his profit would have been much less, though the general advantage would have been much greater: possibly in his case his gardens were comparatively isolated, and not subject to migrations from those of less careful neighbours. While on this point we observe that Miss Ormerod is inclined to believe in the supposed migration of the hop-aphis from plum to hop. The habit of migration in *Aphides* from one plant to another totally different is most strongly asserted by Lichtenstein, and almost as strongly pooh-poohed by others. At present we incline to the side of the observant French *savant*, because he states results from actual observation and experiment, whereas his opponents simply deny the possibility.

On one point we do not think Miss Ormerod has proved her case. She inclines to the belief that Myriopods ("False wire-worms" as she terms them) are "pests," and do devour healthy vegetable growth; nothing is impossible, but more proof than that given will be required in order to convince those who hold a contrary opinion.

That much vexed sparrow question is touched upon, not in a manner favourable to the sparrow. It is really a vexed question, and we fear will remain so. In the